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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/943,551	08/30/2001	Leonid Krasny	4015-987	9640

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EXAMINER	
DOAN, PHUOC HUU	
ART UNIT	**PAPER NUMBER**
2684	4

DATE MAILED: 08/12/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/943,551	KRASNY ET AL.	
	Examiner	Art Unit	
	Phuoc H Doan	2684	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-16,18-23 and 25-31* is/are rejected.

7)☒ Claim(s) *17 and 24* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 3.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-7, 9-16, 18-23, 25-27, and 29-31 are rejected under 35 U.S.C. 102(e) as being anticipated by Goren et al (Pub. No.: US 2002/0098852).

As to claim 1, Goren et al discloses a method of determining an arrival time of a received signal (Fig. 15) comprising two or more multipath components (column 12, paragraphs [0136-0137]), the method comprising: using a sub-optimal estimation algorithm to identify one or more time windows (column 12, paragraphs [0138-0141]); and determining a time estimate for one or more multipath components of said received signal by using an optimal search algorithm bounded by said time windows (column 13, paragraphs [0144-0151]).

As to claim 2, Goren et al further discloses that wherein using a sub-optimal estimation algorithm to identify one or more time windows (Fig. 13, column 13, paragraphs [0144-0145]) comprises: processing said received signal to identify an approximate time estimate for one or more multipath components of said received

Signal (column 14, paragraphs [0152-0154]); and defining said one or more time windows as one or more spans of time encompassing a range of time around said approximate time estimates (column 14, paragraphs [0152-0153]), such that said optimal search algorithm operates within a reduced search space (column 14, paragraphs [0157-0159]).

As to claim 3, Goren et al further discloses that comprising: assuming a maximum number of multipath components for at least one of said one or more time windows (column 12, paragraphs [0140-0141]); and restricting said optimal search algorithm to estimation trials involving no more than said maximum number of multipath components for said at least one time window (column 13, paragraphs [0148-0149]).

As to claim 4, Goren et al further discloses that wherein using a sub-optimal estimation algorithm to identify one or more time windows comprises processing at least a portion of said received signal using a Multiple Signal Identification and Classification (MUSIC) algorithm (column 12, paragraphs [0138-0140]).

As to claim 5, Goren et al further discloses that wherein using a sub-optimal estimation algorithm to identify one or more time windows comprises processing at least a portion of said received signal using a correlation algorithm (column 12, paragraphs [0131-0134]).

As to claim 6, Goren et al further discloses that further comprising iteratively applying said correlation algorithm to said received signal to better resolve one or more correlation peaks in said received signal corresponding to said one or more multipath signals comprising said received signal (column 13, paragraphs [0149-0150]).

As to claim 7, Goren et al further discloses that further comprising restricting said optimal search algorithm to time windows defined around said one or more correlation peaks (column 12, paragraph [0141]).

As to claim 9, Goren et al further discloses that wherein said optimal algorithm comprises a maximum likelihood estimation algorithm (column 5, paragraph [0072]).

As to claim 10, Goren et al discloses a method of determining an arrival time for a received signal (Fig. 15) having multipath signal components (column 12, paragraphs [0136-0137]), the method comprising: processing said received signal using a sub-optimal algorithm to identify one or more time intervals corresponding to one or more probable multipath signal arrival times (column 11 through column12, paragraphs [0128-0135]); and generating a time estimate for said received signal based on resolving said one or more probable multipath signals within said one or more time intervals using an optimal search algorithm restricted to said one or more time intervals (column 13, paragraphs [0144-0151]).

As to claim 11, Goren et al further discloses that wherein resolving said one or more probable multipath signals within said one or more time intervals using an optimal search algorithm restricted to said one or more time intervals comprises (column 13, paragraphs [0149-0151]): defining a plurality of time positions across at least one of said time intervals, wherein said time positions are spaced apart according to a desired time resolution for resolving said arrival time of said received signal (column 13, paragraphs [0149-0151]); and applying said optimal search algorithm to said plurality of

time positions to identify a Maximum Likelihood (ML) time position within said time interval (column 15 through column 16, paragraphs [0168-0169]).

As to claim 12, Goren et al further discloses that comprising assuming a maximum number of multipath signals for said received signal for use by said optimal search algorithm if processing said received signal with said sub-optimal algorithm does not yield a probable number of multipath signals (column 14, paragraphs [0152-0153]).

As to claim 13, Goren et al further discloses that wherein processing said received signal using a sub-optimal algorithm to identify one or more time intervals corresponding to one or more probable multipath signal arrival times comprises: identifying one or more received signal peaks (column 12,paragraphs [0139-0141]); and applying a threshold function to said one or more peaks to define said one or more time intervals (column 13, paragraphs [0149-0150]).

As to claim 14, Goren et al further discloses that wherein processing said received signal using a sub-optimal algorithm to identify one or more time intervals corresponding to one or more probable multipath signal arrival times comprises correlating known information with at least a portion of said received signal (column 12, paragraphs [0131-0134]).

As to claim 15, Goren et al further discloses that wherein correlating known information with at least a portion of said received signal comprises correlating a sequence of known values with a sequence of said received signal transmitted as said sequence of known values (column 12, paragraphs [0131-0138]).

As to claim 16, Goren et al further discloses that method comprising iteratively correlating said received signal to better resolve correlation peaks corresponding to at least some of said multipath signals comprising said received signal (column 12, paragraph [0141]).

As to claim18, Goren et al further discloses that comprising restricting said optimal search algorithm to a time window around at least one of said correlation peaks identified by said iterative correlation (column 12, paragraphs (0138-0141]).

As to claim 19, Goren et al discloses a method of determining an arrival time for a received signal (Fig. 7) having multipath signal components (column 7, paragraph 0097]), the method comprising: processing said received signal to identify one or more multipath components (column 8, paragraphs [0104-0105]); canceling said identified multipath components (column 9, paragraph [0115]); and repeating said processing and canceling steps iteratively until the multipath components identified at a previous iteration substantially match the multipath components identified at the current iteration. See (column 10, paragraph [0121]).

As to claim 20, Goren et al further discloses that wherein processing said received signal to identify one or more multipath components comprises processing said received signal using a sub-optimal processing algorithm (column 12, paragraphs [0136-0138]).

As to claim 21, Goren et al further discloses that wherein processing said received signal using a sub-optimal processing algorithm comprises using a MUSIC algorithm to process said received signal (column 12, paragraphs [0139-0140]).

As to claim 22, Goren et al further discloses that wherein processing said received signal using a sub-optimal processing algorithm comprises using a correlation algorithm to process said received signal (column 12, paragraphs [0133-0136]).

As to claim 23, Goren et al further discloses that wherein canceling said identified multipath components comprises treating the identified multipath components as noise, which noise is filtered during processing said received signal in the next iteration (column 10, paragraphs [0121-0122]).

As to claim 25, Goren et al discloses a receiver operative to estimate a time of arrival of a received signal (Fig. 18, column 14, paragraph [0152]), the receiver comprising: a sub-optimal algorithm processor (Fig. 2, item 220) to process said received signal using a sub-optimal algorithm to generate crude estimates for one or more multipath components of said received signal (column 14, paragraphs [0153-0154]); and an optimal algorithm processor to refine said crude estimates for said one or more multipath components of said received signal (column 14, paragraphs [0156-0157]), such that an arrival time of said received signal may be estimated (column 14, paragraphs [0158-0160]).

As to claim 26, Goren et al further discloses the receiver of claim 25 wherein said sub-optimal algorithm processor comprises a MUSIC algorithm processor (column 7, paragraph [0097]).

As to claim 27, the claim is interpreted and rejected for the same reason as set forth in claim 26.

As to claim 29, the claim is interpreted and rejected for the same reason as set forth in claim 26.

As to claim 30, Goren et al further discloses that wherein said receiver comprises a wireless receiver configured for use in a wireless communication network (column 8, paragraph [0105]).

As to claim 31, Goren et al further discloses that wherein said sub-optimal algorithm and optimal algorithm processors (Fig. 2, item 220) comprise at least one DSP programmed to perform sub-optimal and optimal processing of said received signal (column 14, paragraph [0160]).

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 8, 28 rejected under 35 U.S.C. 103(a) as being unpatentable over Goren et al in view of Cai (Pub. No.: US 2003/0204378).

As to claim 8, Goren et al disclose all the limitation of claim 1. However, Goren et al. fail to disclose that processing at least a portion of said received signal using a Signal Eigen Vector (SEV) algorithm.

Cai discloses that processing at least a portion of said received signal using a Signal Eigen Vector (SEV) algorithm (column 2, paragraphs [0026-0037]). Therefore, it

would have been obvious to one of skill in the art at the time the invention was made to provide a Signal Eigen Vector algorithm processor of Cai to the system of Goren et al. as a system design preference to serve the same function as Maximum Likelihood (ML) algorithm processor, a MUSIC algorithm processor.

As to claim 28, Goren et al disclose all the limitation of claim 25. However, Goren et al. fail to disclose that wherein said sub-optimal algorithm processor comprises a Signal Eigen Vector (SEV) algorithm processor.

Cai discloses that wherein said sub-optimal algorithm processor comprises a Signal Eigen Vector (SEV) algorithm processor (Fig. 1, item 36, column 2, paragraphs [0026-0037]). Therefore, it would have been obvious to one of skill in the art at the time the invention was made to provide a Signal Eigen Vector algorithm processor of Cai to the system of Goren et al. as a system design preference to serve the same function as Maximum Likelihood (ML) algorithm processor, a MUSIC algorithm processor.

Allowable Subject Matter

3. Claims 17, and 24 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

As to claim 17, Goren et al disclose the method of claim 1. However, Goren et al. and the cited prior art fail to further disclose wherein iteratively correlating said received signal to better resolve correlation peaks corresponding to at least some of said multipath signals comprising said received signal comprises canceling correlation peaks

identified in a previous correlation iteration in each successive correlation iteration until no new correlation peaks in said received signal are identified.

As to claim 24, the prior art of record do not disclose the method of claim 23 wherein treating the identified multipath components as noise comprises updating a noise correlation matrix at the beginning of each processing iteration based on the identified multipath components from the previous iteration, wherein said noise correlation matrix is used to identify multipath components in each processing iteration of said received signal.

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phuoc H Doan whose telephone number is 703-305-6311. The examiner can normally be reached on 9:30 AM - 6:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Maung A Nay can be reached on 703-308-7745. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Phuoc Doan

8/8/04

QUOCHIEN B. VUONG
PRIMARY EXAMINER